Introduction:

In the world of Customer Relationship Management (CRM), establishing a secure and reliable connection between CRM systems and external applications is crucial for seamless data integration and streamlined workflows. However, connecting a CRM system, such as Microsoft Dynamics 365, with a console application can often present challenges. In this blog post, we will explore the common issues encountered when connecting a CRM system using a console app and discuss how leveraging Azure's App Registration can help overcome these challenges.

Problem Statement:

Additional Point: Deprecation of Other Authentication Methods - Embracing OAuth.

In recent updates, Microsoft has deprecated several legacy authentication methods and encourages developers to adopt OAuth 2.0 as the standard authentication mechanism for connecting applications to CRM systems, including Microsoft Dynamics 365. As a result, it is essential to note that OAuth 2.0 is the recommended and supported approach for authenticating and authorizing console applications when connecting to CRM systems.

Connecting a CRM system with a console application poses various challenges, including:

Authentication: Console applications typically lack user interfaces, making it challenging to establish secure authentication with CRM systems that require user credentials. How can we authenticate and securely connect a console app to a CRM system?

Authorization: Console applications may require specific permissions or roles to access and interact with CRM data. How can we ensure the console app has the necessary authorization to perform desired operations on the CRM system?

Endpoint Configuration: CRM systems often have complex endpoint configurations, including authentication endpoints, resource endpoints, and API versions. How can we properly configure the endpoints within the console application to establish a successful connection with the CRM system?

Secure Storage of Secrets: Console applications often require sensitive information, such as client IDs, client secrets, and tenant IDs, to establish the connection. How can we securely store and retrieve these secrets within the console app to prevent unauthorized access?

Solution:

pre-requisites:

Microsoft Dynamics 365 Sales Trial - This will provide you with the necessary environment to connect your console application to the CRM system.

Azure Subscription - If you don't have an Azure subscription, you can create a free account or use an existing one.

Visual Studio or Equivalent IDE -

Architecture -



Step 1: Configure App registration in Azure Active Directory.

Sign in to the Azure portal: Go to the Azure portal (portal.azure.com) and sign in with your Azure account credentials.

Navigate to Azure Active Directory (**Azure AD**): In the Azure portal, search for and select "Azure Active Directory" from the list of services.

≡	Microsoft Azure	₽ Search r	esources, services,	and docs (G+/)						₽ 🖓 ©	@ &
	Az	ure servic	es								
		+		5		•	2			SQL	\rightarrow
		Create a resource	Azure Active Directory	Virtual machine scale sets	Resource groups	Virtual machines	Quickstart Center	App Services	Storage accounts	SQL databases	More services
	Re	sources									
	Re	ecent Favo	orite								

Access App Registrations: In the Azure AD pane, select "App registrations" from the lefthand side menu. Click on the "New registration" button to start creating a new App Registration.

Home > Default Directory				
Default Directory	App registrations 🖉 ····			×
Overview	+ New registration 🕀 Endpoints 🖉 Troubleshooting 🕐 Refresh 🛓 Download	🐱 Preview features 🛛 🕅 Got feedback?		
 Preview features X Diagnose and solve problems 	Starting June 30th, 2020 we will no longer add any new features to Azure Active Directory Au security updates but we will no longer provide feature updates. Applications will need to be updates.	hentication Library (ADAL) and Azure AD Graph. We will c pgraded to Microsoft Authentication Library (MSAL) and I	ontinue to provide techr Microsoft Graph. <u>Learn r</u>	nical support and X
Manage	All applications Owned applications Deleted applications Applications from	n personal account		
 Users Groups 		ilters		
External Identities	1 applications found			
Administrative units	Display name ↑↓	Application (client) ID	Created on $~\uparrow\downarrow~$	Certificates & secrets
🔶 Delegated admin partners	cc Connect CRM	6807babb-fe90-4559-b28d-394947c95808	5/16/2023	🛇 Current
Enterprise applications				
Devices App registrations Identity Governance Application proxy				

Provide registration details: In the "Register an application" form, provide the following details:

Enter an application name - Give your application a meaningful name.

Supported account types - Choose the appropriate account types for your scenario (e.g., single tenant, multi-tenant, personal Microsoft accounts).

Redirect URI (optional) - Specify the redirect URI if your application requires one for authentication.

Register the application: Click on the "Register" button to create the App Registration.

Home > Default Directory App registrations >
Register an application
* Name
The user-facing display name for this application (this can be changed later).
AzBlogCRM
Supported account types
Who can use this application or access this API?
Accounts in this organizational directory only (Default Directory only - Single tenant)
Accounts in any organizational directory (Any Azure AD directory - Multitenant)
🔿 Accounts in any organizational directory (Any Azure AD directory - Multitenant) and personal Microsoft accounts (e.g. Skype, Xbox)
O Personal Microsoft accounts only
Help me choose
Redirect URI (optional)
We'll return the authentication response to this URI after successfully authenticating the user. Providing this now is optional and it can be
changed later, but a value is required for most authentication scenarios.
Web V http://localhost
Register an app you're working on here. Integrate gallery apps and other apps from outside your organization by adding from Enterprise applications.
By proceeding, you agree to the Microsoft Platform Policies 🖓
4
Register

Obtain the client ID: After the registration is complete, you will be redirected to the Overview page for your App Registration. Note down the "Application (client) ID" value, as you will need it for authentication and authorization.

Home > Default Directory App registra	itions >				
🔣 AzBlogCRM 🖉 …					
✓ Search «	📋 Delete 🌐 Endpoint	s 🐱 Preview features			
Overview					
QuickstartIntegration assistant	Display name	: AzBlogCRM	Client credentials	: Add a certificate or secret	
Manage	Object ID	: 7f7de4d6-cc9c-47ba-a01d-826ea5354a7a	Application ID URI	: <u>Add an Application ID URI</u>	
 Branding & properties Authentication 	Directory (tenant) ID Supported account type	: d30c84a3-9714-41a8-9fe6-91b692758870 es : <u>My organization only</u>	Managed application in I.	: <u>AzBlogCRM</u>	
Certificates & secrets Token configuration	() Welcome to the ne	w and improved App registrations. Looking to learn how it's chan	nged from App registrations (Legacy)? Lear	rn more	×
 API permissions Expose an API 	Starting June 30th, and security updat	2020 we will no longer add any new features to Azure Active Dire es but we will no longer provide feature updates. Applications wil	ectory Authentication Library (ADAL) and A I need to be upgraded to Microsoft Auther	zure AD Graph. We will continue to provide technical support ntication Library (MSAL) and Microsoft Graph. <u>Learn more</u>	×
App roles Owners	Get Started Docum	nentation			

Configure API permissions: Next we have to provide API permission to the APP. on same App page go to **API Permissions** option Click on **Add Permission** and in the list Select **Dynamics CRM**.

Home > Default Directory App regist	trations > AzBlogCRM	Request API permission	15		×
	Refresh R Got feedback? The "Admin consent required" column shows the organization, or in organizations where this app v Configured permissions Applications are authorized to call APIs when they ar all the permissions the application needs. Learn more	Select an API Microsoft APIs APIs my organization Commonly used Microsoft APIs Microsoft APIs Microsoft Graph Take advantage of the tren Access Azure AD, Excel, Ints single endpoint.	n uses My APIs nendous amount of data in Office 365, Enterpris rune, Outlook/Exchange, OneDrive, OneNote, Sh	e Mobility + Security, and Windows 10. arePoint, Planner, and more through a	
Certificates & secrets II Token configuration API permissions Expose an API An or nes	Add a permission of Grant admin consent f API / Permissions name Type D Microsoft Graph (1) User.Read Delegated Si	Azure Service Management Programmatic access to much of the functionality available through the Azure portal	Azure Storage Secure, massively scalable object and data lake storage for unstructured and semi-structured data	Dynamics CRM Access the capabilities of CRM business software and ERP systems	
Owners Owners Owners Manifest Support + Troubleshooting	To view and manage consented permissions for indix	Office 365 Management APIs Retrieve information about user, admin, system, and policy actions and events from Office 365 and Azure AD activity logs	Power Automate Embed flow templates and manage flows	Programmatic access to Dashboard resources such as Datasets, Tables, and Rows in Power Bl	
 Troubleshooting New support request 		SharePoint Interact remotely with SharePoint data	Skype for Business Integrate real-time presence, secure messaging, calling, and conference capabilities		

Then Select **Delegated Permission**. Select the **User Impersonation** permission. Then click **Add Permission** button.



Next, we have to Grant Admin Consent for the permission. Click the **Grant** admin consent and click **Yes**. This the necessary for the app to function -

Home > Default Directory App registr	ations > AzBlogCRM					
AzBlogCRM API p	ermissions 🖈 …					\times
₽ Search «	🖒 Refresh 🛛 🕂 Got feedb	ack?				
Overview	Grant admin consent co	onfirmation.				
Quickstart	Do you want to grant consent	for the requeste	d permissions for all accounts in Default Directory? Th	his will update any existing admin consent record	s this application already	has to
💉 Integration assistant	match what is listed below.					
Manage	Yes No					
🔤 Branding & properties						
Authentication	Configured permissions					
📍 Certificates & secrets	Applications are authorized to ca all the permissions the applicatio	II APIs when they in needs. Learn m	are granted permissions by users/admins as part of the c ore about permissions and consent	onsent process. The list of configured permissions sh	ould include	
Token configuration			0			
API permissions	+ Add a permission	ant admin consen	t for Default Directory			
🙆 Expose an API	API / Permissions name	Туре	Description	Admin consent requ Status		
App roles	✓ Dynamics CRM (1)					
A Owners	user_impersonation	Delegated	Access Common Data Service as organization users	No		
& Roles and administrators	∽ Microsoft Graph (1)					
0 Manifest	User.Read	Delegated	Sign in and read user profile	No	•••	
Support + Troubleshooting	To view and manage concerted a	permissions for in	dividual anns as well as your tenant's consent estrings to	/ Enternrise annlications		
Troubleshooting	to view and manage consented p	vermissions for in	uniqual apps, as well as your tenant's consent settings, try	Principiise applications.		

Now, the status will display as Granted. Now we are ready to process next step.

Manage	The "Admin consent require organization, or in organizat	d" column show ions where this a	s the default value for an organization. However, user consent app will be used. <u>Learn more</u>	can be customized per permiss	ion, user, or app. This column may no	ot reflect the value in your				
🔤 Branding & properties										
Authentication	Configured permissions									
📍 Certificates & secrets	Applications are authorized to call APIs when they are granted permissions by users/admins as part of the consent process. The list of configured permissions should include all the permissions the application needs. Learn more about permissions and consent									
Token configuration										
API permissions	+ Add a permission 🗸 Grant admin consent for Default Directory									
Expose an API	API / Permissions name	Туре	Description	Admin consent required	Status					
App roles	∽ Dynamics CRM (1)									
A Owners	user_impersonation	Delegated	Access Common Data Service as organization users	No	Granted for Default Directory					
👃 Roles and administrators	∽Microsoft Graph (1)									
III Manifest	User.Read	Delegated	Sign in and read user profile	No	Granted for Default Directory					
Support + Troubleshooting										
Troubleshooting	To view and manage consented permissions for individual apps, as well as your tenant's consent settings, try Enterprise applications.									

Generate and securely store a client secret: If your console application requires a client secret, select "Certificates & secrets" from the left-hand side menu under your App Registration.

Click on the "New client secret" button.

Manage	Application registration cert	ificates secrets and federated credent	tials can be found in the tabs belo	W.
🔤 Branding & properties	• • • • • • • • • • • • • • • • • • • •			
 Authentication Certificates & secrets 	Certificates (0) Client secr	rets (0) Federated credentials	(0)	
Token configuration	A secret string that the applicati	ion uses to prove its identity when	requesting a token. Also can be	e referred to as application password.
API permissions	+ New client secret			
🙆 Expose an API	Description	Expires	Value 🕕	Secret ID
🌇 App roles	No client secrets have been cre	ated for this application.		
A Owners				
👃 Roles and administrators				
Manifest				

Enter a description for the client secret and select an expiration period. Click on the "Add" button to generate the client secret. Note down the generated value as it will be needed for your console application's authentication.

Add a client secret		×
Description	CRM Connect for Azure Blog	
Expires	Recommended: 180 days (6 months)	\sim

Tip - Now quickly copy the Secret ID and value. Because if you do not copy after sometime you will not get the value.

This Secret Value is required in our code.

Authentication	 Application registration certificates, secr 	ets and federated credenti	als can be found in the tabs below.		×				
📍 Certificates & secrets									
Token configuration	Certificates (0) Client secrets (1)	Federated credentials (0)						
API permissions	A secret string that the application uses to	secret string that the application uses to prove its identity when requesting a token. Also can be referred to as application password.							
🔷 Expose an API									
App roles	New client secret								
A Owners	Description	Expires	Value 🕕	Secret ID	Copied				
& Roles and administrators	CRM connect for Azure blog	12/6/2023	QIP8Q~1aKDrPOJuX2HTHLEtTfSkR0	5q.R6 🗋 1b4b1f3f-74c4-4368-9770-00	9f1d02979c 🗅 🧻				
0 Manifest									
Support + Troubleshooting									

Step 2: Configure Application user in Dynamics 365 Admin Centre.

Go to **'admin.powerplatform.microsoft.com'** Click on the desired environment then click on settings. (In this way we don't need to add Application ID it will be automatically added)-

	Power Platform	ı admiı	n center										
=			+ New 🖒 Refresh 🗟 Recently d	eleted env	ironments 📮 Environments	overview 🛈 Learn about Mar	naged Environments						
ŵ	Home		Environments	Environments									
≞	Environments												
k	Analytics	\sim	Environment		Туре	State	Dataverse	Managed					
20	Billing (Preview)	\sim	NavCRM (default)		Default	Ready	No	No					
1	Settings		Sales Trial		Trial (subscription-based)	Ready	Yes	No					
20	Resources	\sim											
C	Help + support												

	Power Platfor	m adm	in center				¢3 (
=			🗅 Open 🗔 Resources 🗸 🛞 Settings 🚏	Convert to production 🗋 Copy 🛍 Delete	🕚 History		
ଜ	Home		Environments > Sales Trial				
≞	Environments						
k	Analytics	\sim	Details		See all Edit	Access	
20	Billing (Preview)	\sim	Environment URL	State		Security roles	
<u>نې</u>	Settings		org45cb0857.crm8.dynamics.com	Ready		See all	
20	Resources	\sim	Region India	Refresh cadence Frequent		Teams See all	
្រ	Help + support		Type Trial (subscription-based)	Security group		Users	
R	Data integration		Organization ID	Environment ID		S2S anns	
(jt)	Data (preview)		b13bfb73-4008-ee11-a66d-6045bd71fbdd	eee804c2-e0a7-efaa-a4a6-2f0283f0dfd2		See all	
De	Policies	\sim				Business Units See all □	

Now, click on 'User + permissions' and click Application user -



Click on +New app user and then click on +Add app -

Power Platfor	m adm	in center			Create a new app user				
		+ New app user							
公 Home		Environments > Sales Trial > Settings >	Applicatior	n users	App * 2				
🕭 Environments		Manage the non-interactive users in this environment	Manage the non-interactive users in this environment so your apps can access Dataverse data. Learn more						
Analytics	\sim	Name		App ID	Business unit *				
🗔 Billing (Preview)	\sim	Power Apps Checker Application		c9299480-c13a-49db-a7ae-cdfe54fe0313	099560051				
🔅 Settings		Microsoft Forms Pro	:	10dd5h37-d116-48ch-00d2-4aa56606cha1	Security roles(0)				
Resources	\sim	microsoft offis Fro		15003037-0110-4005-3002-4005000001					
🖓 Help + support									
🗟 Data integration									

This view will open. The app registered on Azure earlier will be visible here click on it -

$\left \begin{array}{cc} \leftarrow & Add an app from Azure \end{array} \right $	Active Directory \times
Search by App Name or App ID	
There could be multiple reasons why you Learn more	r app may not show up in the list.
Name 1	App ID
AzBlogCRM	c3cf4c26-4c59-4

Check the business unit same as the environment you working with then click Create -

::: Power Platform	m adn	nin center			Create a new app user	
		+ New app user				
☆ Home		Environments > Sales Trial > Settings >	Applicatio	n users	App *	
A Environments		Manage the non-interactive users in this environment	so your apps	can access Dataverse data. <u>Learn more</u>	AzBlogCRM	
Analytics	\sim	Name		App ID	Business unit *	
Billing (Preview)	\sim	Power Apps Checker Application		c9299480-c13a-49db-a7ae-cdfe54fe0313	0	
l Settings		Microsoft Forms Pro		19dd5b37-d116-48cb-90d2-4aa56696cba1	Security roles(0)	
Resources	\sim					
G Help + support						
🗟 Data integration						
↔ Data (preview)						
Policies	\sim					
Admin centers	\sim					
					Create	Cancel

Now, edit the security role to assign a role to the app to use the desired features -

Select the App then select Edit security roles -

	III Power Platform admin center											
=			🛈 Details 🖉 Edit security roles 🚫 Deactivate									
ሴ	Home		> '# AzBlogCRM' has been successfully addeed this environment.									
≞	Environments		Environments > Sales Trial > Setting	Environments > Sales Trial > Settings > Application users								
6	Analytics	\sim	Manage the non-interactive users in this enviro	Manage the non-interactive users in this environment so your apps can access Dataverse data. Learn more								
20	Billing (Preview)	\sim	Name		App ID	State	App type	Security roles				
ŝ	Settings		# AzBlogCRM	:	c3cf4c26-4c59-4e2c-897c-5d56f0b49259	Active	Custom	0				
De.	Resources	\sim	Power Apps Checker Application	:	c9299480-c13a-49db-a7ae-cdfe54fe0313	Active	Custom	0				
Û	Help + support		Microsoft Forms Pro	:	19dd5b37-d116-48cb-90d2-4aa56696cba1	Active	Custom	0				
R	Data integration											
(jp	Data (preview)											

Now, choose the specific roles or permissions you want to assign to the user.

This step allows you to define the level of access and capabilities the user will have when interacting with the Dynamics CRM system.

Select the appropriate roles based on your requirements and the operations the console application needs to perform on the CRM data.

Select the roles you want to assign to the user -

III Power Platform admin center				Edit	× ^					
=		① Details 🖉 Edit security roles 🛇 Deactivate				# AzBlogCRM				
命 Home		*# AzBlogCRM' has been successfully added to this environment.			Busine org45	ess unit: * 5cb0857	~			
Environments	~	Environments > Sales Trial > Settings > Application users Manage the non-interactive users in this environment so your apps can access Dataverse data. Lea				Role 1				
Billing (Preview)	×	Name		App ID		Activity Feeds				
🔅 Settings				c3cf4c26-4c59-4e2c-897c-5d5		AIB Roles				
Resources	\sim	Power Apps Checker Application		c9299480-c13a-49db-a7ae-cdf		AIB SML Roles				
🖓 Help + support		Microsoft Forms Pro		19dd5b37-d116-48cb-90d2-4a		Analytics Report Author				
🗟 Data integration					\bigcirc	App Deployment Orchestration Role				
🐼 Data (preview)						App Opener				
Policies	\sim					App Profile Manager Administrator				
Admin centers	\sim					App Profile User				
						Async ingestion				
						Basic User				
						BizQAApp				
						Bot Author				
						Bot Contributor				
						Save	Cancel			

In my case I have given **System customizer**, **system administration** since I have to read write data in excel, you can give any according to your use case -

::: Power Platfor	III Power Platform admin center									PR
=		🛈 Details 🖉 Edit	○ Details							
命 Home		Security roles updates fo	Security roles updates for app user * AzBlogCRM has finished successfully.							×
Environments		Environments >	Environments > Sales Trial > Settings > Application users							
Analytics	\sim	Manage the non-interactive users in this environment so your apps can access Dataverse data. Learn more								
Billing (Preview)	\sim	Name	Name App ID State App type Security							
🔅 Settings		AzBlogCRM		:	c3cf4c26-4c59-4e2c-897c-5d56f0b49259	Active	Custom	2		
Resources	\sim	Power Apps C	hecker Application	:	c9299480-c13a-49db-a7ae-cdfe54fe0313	Active	Custom	0		
😡 Help + support		Microsoft Forms Pro : 19dd5b37-d116-48cb-90d2-4aa56696cba1 Active Custom 0						0		
C. Data integration										

We have successfully registered the app now we are ready to connect CRM using Console Application.

Step 3: Create a console Application in C# and use Client ID and Client Secret for CRUD operation.

Create console application and add required Microsoft assemblies using NuGet Package Manager.

Once added all Microsoft XRM assemblies modify the **Program.cs** class file to add below code.

You will need **"organizationUri"** of your environment and **"clientId"** "clientSecret" you copied and saved earlier from azure.

```
using System;
using System.Configuration;
using System.Security.Cryptography;
using System.Text;
using Microsoft.Xrm.Sdk;
using Microsoft.Xrm.Sdk.Query;
using Microsoft.Xrm.Tooling.Connector;
class Program
{
    static void Main(string[] args)
    {
        Console.WriteLine("Console App started");
        IOrganizationService orgService;
        orgService = GetOrganizationServiceClientSecret(
            "c77c4ed4-d0a4-4c1f-b73f-1328ec49e21e",
            "W2R8Q~cqlcQkXdBhdxA_8Xzt7Fq0OnhmkwiJ_ch~",
            "https://org45cb0857.crm8.dynamics.com/");
        if (orgService != null)
        {
            Console.WriteLine("Connection Successful!...\n");
            Entity account = new Entity("account");
            account["name"] = "Mohit Account";
            var createacc = orgService.Create(account);
            Console.ReadKey();
        }
        else
        {
            Console.WriteLine("Failed to Establish Connection!!! \n");
            Console.ReadKey();
        }
    }
    public static IOrganizationService GetOrganizationServiceClientSecret(string
clientId, string clientSecret, string organizationUri)
    {
        try
        {
            var conn = new
CrmServiceClient($@"AuthType=ClientSecret;url={organizationUri};ClientId={clientId};Clien
tSecret={clientSecret}");
            return conn.OrganizationWebProxyClient != null ?
conn.OrganizationWebProxyClient : (IOrganizationService)conn.OrganizationServiceProxy;
        }
        catch (Exception ex)
        {
            Console.WriteLine("Error while connecting to CRM " + ex.Message);
            Console.ReadKey();
            return null;
        }
    }
}
```

Challenges Faced:

Authentication and Authorization: One of the main challenges when connecting a CRM system with a console application is implementing secure and reliable authentication and authorization. Managing user credentials, ensuring secure access, and handling tokens can be complex and prone to errors.

Endpoint Configuration: Configuring the correct endpoints for the CRM system within the console application can be challenging. Incorrect endpoint configuration can result in connection failures or data retrieval issues.

Secure Storage of Secrets: Storing sensitive information, such as client IDs and client secrets, within the console application securely is crucial. Without proper measures, storing secrets within the application code can expose them to potential security risks.

Business Benefits:

Streamlined Data Integration: Connecting a console application to a CRM system enables seamless data integration. This allows businesses to consolidate data from various sources, providing a unified view of customer information, enhancing decision-making, and improving operational efficiency.

Automation of CRM Tasks: By connecting a console application to a CRM system, businesses can automate repetitive or time-consuming CRM tasks. This reduces manual effort, improves productivity, and ensures consistency and accuracy in CRM-related processes.

Customized Workflows and Business Logic: A connected console application allows businesses to implement custom workflows and business logic tailored to their specific needs. This flexibility enables the automation of unique business processes, ensuring optimal utilization of the CRM system.

Enhanced Data Synchronization: Console applications can facilitate seamless data synchronization between the CRM system and external databases or applications. This ensures that data remains consistent across multiple systems, providing a holistic view of customer information and supporting data-driven decision-making.

Improved Customer Experience: Connecting a console application with a CRM system enables businesses to provide a more personalized and efficient customer experience. Access to real-time CRM data empowers customer service representatives to better understand customer needs, resolve issues promptly, and deliver personalized interactions.

References –

(Reference: <u>https://docs.microsoft.com/en-us/azure/active-directory/</u>)
(Reference: <u>https://docs.microsoft.com/en-us/dynamics365/</u>)